A

22703 **120 MINUTES**

1. Air Quality Index (AQI) keeps a tab on major air pollutants in the atmosphere such as:
   1. Sulphur Dioxide 2. Ammonia 3. Lead 4. Ground level ozone

   A) 1, 3 & 4 only B) 1, 2 & 3 only C) 2, 3 & 4 only D) All the above

2. The highly persistent and toxic organic chemicals branded as the 12 dirty dozen. Identify the correct examples of the dirty dozen from the given options.
   A) Benzene hexa chloride and endosulfan
   B) Phorate & endosulfan
   C) Heptachlor and polychlorinated biphenyls
   D) Baygon and toxaphene

3. Select the correctly matched pairs in terms of Global Warming Potential (GWP) & Lifetime of Green House Gases

Gas	GWP (100-year)	Lifetime (years)
1.Methane	310	120
2.Nitrous oxide	21	12
3.Perfluorocarbons	6,500-9,200	800-50,000
4.Sulphur hexafluoride	23,900	3,200

   A) 1, 2 & 3 only B) 2, 3 & 4 only C) 1, 3 & 4 only D) 3 & 4 only

4. What is Kigali Amendment which is recently ratified by the Government of India?
   A) On phasing down climate-damaging refrigerant Hydrofluorocarbons
   B) Global conventions on carbon dioxide emission reduction/limitation
   C) On noise pollution – occupational hazards
   D) Phase out heavy metal pollution & biocide residues

5. What is meant by Black Rain?
   A) Debris and soot from the destroyed buildings in Hiroshima mixed with the radioactive fallout from the bomb, rose high into the atmosphere in the form of a mushroom cloud.
   B) Soot and black carbon rose high into the atmosphere mixed with water vapour
   C) Asiatic cloud formation due to the release of aerosols formed in the combustion of fossil fuels and biomass
   D) Soot and black carbon deposits in glaciers reduce albedo effect

6. Which among the following is / are consequences, when an aquatic ecosystem such as a lake experiences an increase in nutrients?
1. The Population of most species of fish will increase
2. The Biological Oxygen Demand of the lake water would decrease
3. The biomass of phytoplankton will increase

A) 1 & 2 only B) 2 only C) 3 only D) 1, 2 & 3

7. Which of the following is/are statutory body/bodies?
1. Central Pollution Control Board (CPCB)
2. National Biodiversity Authority (NBA)
3. Animal Welfare Board of India

A) 2 & 3 only B) 1& 2 only C) 1 & 3 only D) 1, 2 & 3

8. Observe the following statements and identify the national park:
1. It is located on the International border between India and Myanmar (Burma) in Changlang district, in northeast India.
2. The largest national park in India
3. It abode the endangered snow leopards, clouded leopards, red pandas and red fox
4. It occupies the junction of two Biogeographic regions the Indian Sub-Continent and the Indo-China Biogeographic Region

A) Mouling National Park
B) Namdapha National Park
C) Khangchendzonga National Park
D) Pin Valley National Park

9. Identify the pairs which are correctly matched:
1. Chinnar Wildlife Sanctuary - Grizzled Giant Squirrel
2. Eravikulam National Park - Nilgiri Tahr
3. Parambikulam Wildlife Sanctuary - Gaurs
4. Shenduruny Wildlife Sanctuary - Gluta travancorica

A) 1, 2, 3, 4 B) 1, 2 & 3 only C) 1, 2 & 4 only D) 2 only

10. Which among the following is/are the elephant reserves in India?
1. Mayurjharna 2. Kameng 3. Dihing-Patka 4. Singphan

A) 2 & 4 only B) 1, 3 & 4 only C) 1, 2 & 4 only D) 1, 2, 3 & 4

11. Identify the critically endangered species prescribed by IUCN given below.
A) Red panda B) Malabar Civet
C) Blue whale D) Dhole

12. Identify the family which shows pseudo-embryo sac?
A) Podostemaceae B) Asteraceae
C) Solanaceae D) Caryophyllaceae

13. Nicks and irregularity from the knife edge used in microtome is removed by ---- technique

A) Router bit B) Honing C) Laser D) Stropping

14. Observe the following statements connected with paraffin waxes and chose the correct ones.

1. Commercially available paraffin waxes commonly used for histological applications are straight chains of 20–40 carbon atoms (alkanes)
2. It melts in the range of 36–37 °C.
3. Most of them are mixtures of paraffin and plastic polymers with the trade names Paraplast, Paramat and Polyfin

A) 1 & 2 only B) 1 & 3 only C) 1 only D) 1, 2 & 3

15. Kani tribes give valuable information about medicinal plants and their ethnic uses. Which among the following plants are examples which support this statement?

1. *Ceropegia spiralis* 2. *Andrographis paniculata* 3. *Chasalia curviflora*

A) 2 & 3 only B) 1 & 3 only C) 1 & 2 only D) 1, 2 & 3

16. 1. Excurrent: The lateral branches grow more vigorously and outcompete the main trunk, giving a dome-shaped appearance
2. Decurrent: The branches arise from the main stem in acropetal succession and the tree assumes a cone like appearance

A) 1 only B) 2 only
C) Both 1 & 2 D) Neither 1 nor 2

17. Systematic detailed document containing a comprehensive account of a specific taxonomic group such as a genus or family is known as:

A) Revision B) Manual C) Flora D) Monograph

18. Which among the following is/are considered as demerits of the Engler and Prantl classificatory system?

1. Monocotyledons were placed prior to dicotyledons.
2. Treated achlamydeous flowers in a primitive manner, which could be a derived condition. More evidence exists to show that unisexual families are more advanced than bisexual families. Heloise, a primitive order, is sandwiched between two more advanced orders, Pandanales and Glumiflorae.
3. Gymnosperms are placed among Dicotyledons

A) 1 only B) 2 & 3 only C) 1 & 2 only D) 1, 2 & 3

19. What is Endymion type embryosac formation?
A) In this type micropylar dyad cell participates in the formation of the embryo sac
B) 4 megaspore nuclei divides twice, resulting in a total of 16 nuclei which become more or less uniformly distributed
C) embryo sac is derived from the micropylar megaspore of the tetrad and is four nucleate
D) In this type chalazal dyad cell participates in the formation of the embryo sac

20. The binomial of Red Sandal Wood endemic to the Southern Eastern Ghats mountain range of South India:
A) *Santalum album* B) *Pterocarpus marsupium*
C) *Pterocarpus santalinus* D) *Butea monosperma*

21. Dammar designates a group of resins obtained from Indian or East-Asian trees. Binomial of White dammer is ---------.
A) *Vateria indica* B) *Shorea robusta*
C) *Canarium strictum* D) *Dipterocarpus indicus*

22. The chromic acid, osmic acid and acetic acid that makes an ideal cytoplasmic and chromosomal fixative in------.
A) FAA B) Carnoys fluid
C) Flemmings fluid D) Clark fluid

23. Identify the correctly matched pair:
A) Orthotropous ovule - Chenopodiaceae
B) Campylotropous ovule - Piperceae
C) Amphitropous ovule - Alismaceae
D) Hemianatropous ovule - Butomaceae

24. ------- is a database that can be used to quickly identify segments within nucleic acid sequences which may be of vector origin and is a non-redundant vector database available from NCBI.

A) NONCODE B) EXPASY C) Clusters D) UniVec

25. Chose the correct statement/s from the following:
1. Peripatric speciation is a mode of speciation in which there is no extrinsic barrier between the populations but, the large geographic range of the population causes the individuals to mate with the neighboring individuals than with the individuals in a different part of the geographical range.
2. Parapatric speciation is a mode of allopatric speciation which occurs when the size of the isolated subpopulation is small. Here, in addition to geographic separation, genetic drift acts more quickly in small populations
3. Sympatric speciation: the process of the formation of new species from an original population that is not geographically isolated

A) 2 & 3 only B) 1 & 3 only C) 3 only D) 1, 2 & 3

26. Choose the correct statements connected with Synthetic theory of Evolution:
1. Synthetic theory of evolution of Huxley emphasizes that the populations as the units of evolution and the natural selection as the major mechanism of evolution
2. Natural selection operates through non-differential reproduction and comparative reproductive success
3. Due to sexual communication, there is free flow of genes so that the genetic variability which appears in some individuals, gradually spreads from one deme to another deme, from deme to population and then on neighbouring sister populations and culminates on most of the members of a species

A) 1 & 2 only B) 1 & 3 only C) 2& 3 only D) 1, 2 & 3

27. Which among the following spatial pattern affects the ecosystem structure?
A) Stratification B) Zonation
C) Both A & B D) Density & distribution

28. Identify the most productive aquatic ecosystem in terms of Net Primary Production per unit area:
A) Estuaries B) Lakes & streams
C) Continental shelf D) Open ocean

29. Which among the following is/are example/s of natural measures of pest control?
1. Crop rotation 2. Trap crop
3. Neem oil 4. Cultivation of resistant variety

A) 1, 3 & 4 only B) 3 & 4 only
C) 1 & 2 only D) 1, 2, 3 & 4

30. Third generation biofuels is the fuel from ------.
A) Food sources like sugar, starch, vegetable oil
B) Micro-organisms like algae
C) Non-food crops or portions of food crops
D) Crops that are genetically engineered

31. Choose the correct statement/s connected with Clementsian concepts of climax:
1. It advocates mono-climax theory of succession i.e., every region has one climax community toward which all communities are developing.
2. It is believed that climate was the determining factor for vegetation and the climax of any area was solely a function of its climate.
3. Many different types of vegetation as climax communities may be recognized in a given area. Climaxes are controlled by soil moisture, soil nutrients, activity of animals and other factors

A) 1 only B) 1& 2 only C) 2 & 3 only D) 1, 2 & 3

32. Which among the following plant shows discontinuous bark of unequal thickening known as scaly bark?
A) Neem B) Eucalyptus C) Betula D) All the above

33. Select the correctly matched pair of Root Stem Transition type with correct example given below.

Type	Examples
1. Fumaria	Phaseolus
2. Cucurbita	Mirabilis
3. Lathyrus	Phoenix
4. Anemarrhena	Medicago

A) 4 only B) 1 only C) 2 only D) 3 only

34. Identify the family based on Gynoecium
The plants characterized with tricarpellary, syncarpous, superior, unilocular, 2 to many campylotropous ovules on basal placenta; styles 2-5; stigma 2-5 or as many as carpels is:
A) Dipterocarpaceae B) Portulacaceae
C) Brassicaceae D) Polygalaceae

35. Which among the following are examples for Metachromatic Dyes?
1. Methylene blue 2. Thionin
3. Crystal violent 4. Toluidine blue

A) 1 & 4 only B) 2 & 3 only C) 1 & 2 only D) All of these

36. Which among the following is/are features of Anomalous secondary growth in Boerhaavia?

1. Anomalous secondary growth is characterized by the formation of successive cambial rings
2. Secondary xylem in the intra fascicular region and lignified conjunctive tissue in the inter fascicular region on the inner side. Externally Secondary phloem in the intra fascicular region and parenchyma from the inter fascicular region opposite the conjunctive tissue.

A) 1 only B) 2 only C) Both 1 & 2 D) Neither 1 nor 2

37. Select the correctly matched pair connected with root tubers with the plant species as an example
A) Fasciculated tuberous roots - Portulaca
B) Moniliform adventurous roots - Dahlia
C) Annulated storage roots - Psychrotia
D) Nodulose storage roots - Tinospora

38. The specimen that is chosen to act as the 'type' material subsequent to a published original description. This occurs in cases where the original type have been lost or where they have been destroyed designated as
A) Isotype B) Lectotype C) Holotype D) Neotype

39. Biodiversity is evaluated by species richness, and species evenness. If so, Ecosystem A has 6 tigers, 8 deer and 9 rabbits. Ecosystem B has 3 tiger, 5 deer and 4 rabbits. Select the correct statement related with species richness and evenness in the ecosystem A & B from the given options.

A) Ecosystem A & B has the same richness, but Ecosystem A has more evenness than the sample forest B

B) Ecosystem A & B has the same evenness, but Ecosystem A has more richness than Ecosystem B

C) Ecosystem B has more evenness and richness than Ecosystem A

D) Ecosystem A has more richness and evenness than the Ecosystem B

40. Observe the statements connected with the family Urticaceae and select the salient characters

1. Flowers small, usually unisexual, actinomorphic
2. 5-merous, perianth persistent; accrescent, or non-accrescent; imbricate, or valvate.
3. Stamens alternitepalous, filaments straight in bud
4. Female flowers have two simple pistil with a superior or inferior ovary that contains one basal ovule in its solitary locule. The stigma is brushlike and fruit usually a dry achene

A) 2 & 3 only B) 1 & 2 only C) 1, 2 & 3 only D) 1, 2, 3 & 4

41. The goodness of fit test is a statistical hypothesis test to see how well sample data fit a distribution from a population with a normal distribution and is tested effectively by:

A) T-test B) F test C) Chi-square D) Z test

42. Observe the following statements connected with HPLC and FPLC. Identify the correct difference between the two instruments.

A). HPLC is considered a preparative technique while FPLC is an analytical technique

B) HPLC chromatography software controls the modules as well as integrating collection of the purified samples into the fraction collector FPLC software controls the instrumentation and analyzes the data

C) HPLC resins are made of silica beads with small particle sizes that can stand very high back pressures. FPLC uses agarose, polymer materials, or silica materials. The particle sizes for FPLC are larger and have large pore sizes

D) HPLC uses salt buffers for the mobile phase and FPLC uses solvents for the mobile phase

43. Which among the following is/are examples for Ligases?

1. Glutamine synthetase 2. Succinate thiokinase
3. Acetyl CoA carboxylase 4. Histidase

A) 2 & 3 only B) 2 only C) 1, 2 & 3 only D) 2, 3 & 4 only

44. Match the energy bonds with the amount of energy it liberates.

Bonds	Energy
a. 3rd acyl phosphate bond	1. liberates 49kj/mol bond of energy
b. 4th guanidine phosphate bond	2. liberates 43 kj/ mol bond
c. 1st phosphoanhydride bond	3. liberates 7.3 kcal/ mol bond of energy
d. 2nd enol phosphate bond	4. liberates 64kj / mol bond of energy

A) a-1, b-2, c-3, d-4 B) a-4, b-3, c-2, d-1
C) a-1, b-2, c-4, d-3 D) a-2, b-1, c-3, d-4

45. The inhibitor does not combine with the free enzyme or affects its reaction with its normal substrate; however, it does combine with the enzyme-substrate complex. The kinetics Slope [Km/Vmax] is not changed, while Intercept on ordinate [1/Vmax] is changed is known as-------- inhibition
A) Competitive B) Uncompetitive
C) Noncompetitive D) Allosteric

46. Identify the scientists who discovered the ribozymes.
A) Richard J. Roberts & Phillip A. Sharp
B) Thomas Cech & Sidney Altman
C) R.Everett & R.Hen
D) Khorana & Nirenberg

47. Dwarfing gene to improve lodging resistance in winter wheat is:
A) Atomita 1 B) pelita 2 C) Norin 10 D) pal 1

48. Match the following correctly.

a. William S. Gaud	1. Mutation breeding
b. Shull	2. Heterosis
c. Muller and Stadler	3. Natural hybridization
d.Cotton Mather	4. Green revolution

A) a-4,b-3,c-2,d-1 B) a-3,b-2,c-1,d-4
C) a-4,b-2,c-1, d-3 D) a-1,b-2,c-4,d-3

49. BLAST uses a ------ to find matching words, whereas FASTA identifies identical matching words using the ------.
A) blocks, substitution matrix
B) hashing procedure, substitution matrix
C) substitution matrix, hashing procedure
D) ktups, substitution matrix

50. For the 10-residue DNA sequence example, there are ----- possible starting sites for a 20-residue-long site.
A) 41 B) 51 C) 71 D) 81

51. Rotenone colorless, crystalline isoflavone used as a:
A) insecticide B) piscicide C) pesticide D) All the above

52. Identify the species that are crossed to produce sugarcane varieties with high sugar, high yield, thick stems and able to grow in the sugarcane belt of North India?
A) *Saccharum sinense and Saccharum officinarum*
B) *Saccharum barberi and Saccharum robustum*
C) *Saccharum robustum and Saccharum officinarum*
D) *Saccharum barberi and Saccharum officinarum*

53. Transcriptomic technique used by molecular biologists to produce a snapshot of the messenger RNA population in a sample of interest in the form of small tags that correspond to fragments of those transcripts
A) SAGE B) SNP C) EXPASY D) MSA

54. Which among the following is/are used as disinfectants for surface sterilization of the explant in plant tissue culture?
1. Silver nitrate 2. Benzalkonium chloride 3. Sodium hypochlorite

A) 3 only B) 1 & 3 only C) 2 & 3 only D) 1, 2 & 3

55. What is picloram?
A) Synthetic auxin B) flower initiator
C) Seed dormancy breaker D) Antitranspirant

56. Match the following

a. r DNA technology	1. Kohler and Milstein
b. DNA polymerase I	2. Arthur Kornberg
c. Monoclonal antibodies	3. Arber
d. Restriction endonuclease	4. Cohen and H. Boyer

A) a-1, b-2, c-3, d-4 B). a-4, b-2, c-1, d-3
C). a-2, b-4, c-1, d-3 D) a-4, b-2, c-3, d-1

57. The organism potential for application in paper industry for biopulping and residue treatments is:
A) *Quebracho sp.* B) *Pseudomonas sp*
C) *Streptomyces griseus* D) *Lentinus edodes*

58. In DNA Microarray are commonly used to genotype multiple regions of a genome or to generate lists of expressed genes from a cell uses the fluorescent dyes namely
A) Ethidium bromide B) Sybr green
C) Cyn 3 + Cyn 5 D) Propidium iodide

59. Online Mendelian Inheritance in Man (OMIM) database was initiated in the early 1960s by ----------.

A) Paulien Hogeweg B) Dr. Walter
C) Dr. Victor A. McKusick D) Margaret Oakley Dayhoff

60. Protein concentration is estimated by measuring the UV absorbance at 280 nm. because Proteins show a strong peak at 280 nm due to absorbance from------.

A) Tyrosine and tryptophan B) Valine and methionine
C) Aspartic and glutamic acid D) Lysine and histidine

61. Identify the correctly matched pairs of Allosteric Regulators of Glycolysis:

Enzyme	Activator	Inhibitor
1.Phosphofructokinase-1	Fructose-1,6-bisphosphate	Citrate
2.Pyruvate kinase	Fructose 1,6-bisphosphate	Acetate

A) 1 only B) 2 only
C) Both 1 & 2 D) None of the above

62. Choose the correct statement(s) connected with water potential:

1. Water potential is virtually positive in the xylem of all terrestrial plants.
2. Water potential is lowered by transpiration from the leaves assisted by the cohesive forces between water molecules causing water to be under tension, i.e., under negative pressure
3. Water always moves from the system with low water potential to the system with high water potential.

A) 1 & 3 only B) 2 & 3 only C) 2 only D) 1, 2, 3

63. Identify the photoreceptors which play a critical role in day length perception and circadian rhythms in plants?

A) GLUT 4 family B) BLUF family
C) Zeitlupe family D) Phototropins

64. Choose the correct statements below related with Cryptochromes:

1. Cryptochromes (CRYs) are globular flavin-containing blue light photoreceptors, present in most kingdoms, including archaea, bacteria, plants, animals and fungi
2. They are structurally similar to light dependent DNA photolyases. Photolyases repair ultraviolet—induced DNA damage by a mechanism known as photoreactivation, using photons absorbed from the blue end of the light spectrum.
3. They regulate plant light morphogenesis, flowering time, circadian clock, seed dormancy and germination, stomatal opening and development, photosynthetic reactions and stress responses
4. CRY genes in plants are invariably two CRY1 and CRY2.

A) 1, 2 & 3 only B) 1 & 4 only C) 1 ,2 & 4 only D) All the above

65. Ethylene biosynthesis has been a subject of intensive study in plant hormone physiology. Analyze the following statements and Select the correct ones:

1. Ethylene is produced from flowers, fruits, tubers and seeds only
2. Met adenosyltransferase enzyme determines the rate of ethylene production, therefore regulation of this enzyme is key for the ethylene biosynthesis
3. Pathway for ethylene biosynthesis is known as Zhang cycle after Lin Z, Zhang who made key contributions to elucidating this pathway

A) 1 only B) 1 & 2 only C) 2 only D) 1, 2 & 3

66. Which among the following is/are examples for Compatible solutes in salinity tolerant species?

1. Simple sugars (fructose and glucose), sugar alcohols (glycerol and methylated inositols)
2. Complex sugars (trehalose, raffinose and fructans), polyols
3. Quaternary ammonium compounds (proline, glycine betaine, beta alanine betaine, proline betaine) and tertiary sulfonium compounds

A) 2 only B) 3 only C) 2 & 3 only D) 1, 2 & 3

67. A researcher identified a lead molecule specifically target the receptors for retinoic acid in order to block stem cell differentiation. After *in vitro* experimentation, the researcher noticed that the cells carry differentiation and the molecule displayed inefficacy. Observe the given reasons by the Researcher

1. The molecule was small in size but hydrophobic in nature
2. The size of the molecule exceeded the size of molecules that could cross the membrane
3. The molecule did not bind to its receptors

Which of the above may be the plausible reason for the ineffectiveness of the molecule?

A) 3 only B) 2 & 3 only C) 2 only D) All the above

68. Choose the correct statement/s:

1. The endosymbiotic relationship of mitochondria with their host cells was popularized by Lynn Margulis
2. Some of the diseases caused by defective mitochondria are: Diabetes mellitus and deafness (DAD), Leber's hereditary optic neuropathy and Leigh syndrome
3. Mitochondria and chloroplast follow maternal inheritance.

A) 1& 2 only B) 3 only C) 1 & 3 only D) 1, 2 & 3

69. Magnesium is a critical element of DNA polymerization, but it is not noticed in the DNA. What is the role of magnesium in DNA polymerization reaction?

A) Cofactor for DNA polymerase II
B) It binds nucleotides in the cytosol and helps import them into the nucleus
C) Cofactor for DNA polymerase III
D) It binds to the two leaving groups during the DNA polymerization reaction

70. Identify the event interferes in sequence based phylogeny?

A) Adaptive mutations B) Reverse transcription
C) DNA repair D) Horizontal gene transfer

71. Observe the following main features of the existing plant quarantine regulations in India and select the correct ones.

1. No consignment of seeds/planting materials shall be imported into India without a valid 'Import Permit', which is to be issued by a competent authority, to be notified by the Central Government from time to time in the Official Gazette.
2. Consignment of seeds/planting materials shall be imported into India without accompained 'Phytosanitary Certificate', issued by the official Plant Quarantine Service of the source country.

A) 1 only B) 2 only C) Both 1 & 2 D) Neither 1 nor 2

72. False Smut of paddy cause the rice grain get transformed into a mass of yellow fruiting bodies and is due to

A) Phakospora B) Ustilago
C) Ustilaginoidea D) Sporisorium

73. Which of the following is a biocontrol agent for nematodal diseases?

A) Paecilomyces lilacinus B) Gliocladium virens
C) Pisolithus tinctorius D) Pseudomonas cepacia

74. Identify the antifungal as well as antibiotic agent from the following.

A) Subtilin B) Pimarcin
C) Sodium benzoate D) Nisin

75. International Society for Horticulture Science (ISHS) is located at ----.

A) China B) India C) Belgium D) France

76. Recombinant insulin can be synthesized by inserting genes for α and β polypeptides into a plasmid by the side of ---------- which after transformation into a host DNA leads to production of recombinant insulin.

A) β - galactosidase gene B) restriction endonuclease gene
C) antibiotic resistant gene D) ori

77. Identify the hormones that can induce the senescence in plants:

1. Cytokinins 2. Abscisic acid 3. Ethylene 4. Salicylic acid

A) 2 & 3 only B) 2 & 4 only C) 1, 2 & 3 only D) 2, 3 & 4 only

78. Identify the correct statements connected with proton hopping.

1. Diffusion of protons through the network of hydrogen bonded water molecules in the liquid water
2. The net results is the fast movement of H+ ions in water than any other dissolved cations like sodium/potassium
3. It was discovered by Cukierman

A) 1 & 2 only B) 1 & 3 only C) 1 only D) All the above

79. Select the correct statement related with the essential element potassium in plants:
A) Potassium in plants is typically 0.1 % on a dry weight basis, but can range from 0.05 to 0.5 % depending on the plant species
B) Potassium is immobile in plants
C) Potassium deficiencies appear along the outer margins of older leaves as streaks or spots of yellow (mild deficiencies) or brown (severe deficiencies).
D) Symptoms most often appear on the growing tip of the plant i.e., the growing tip is often deformed

80. What do you mean by Annomerism?
A) It is the spatial configuration with respect to the first carbon atom in aldoses and the second carbon atom in ketoses
B) 1^{st} carbon of the glucose condenses with the -OH group of the 5^{th} carbon to form a ring structure
C) Long straight-chain form of carbohydrates
D) It is the configurational changes with regard to C2, C3, or C4 in glucose

81. Identify the correctly matched pairs of unsaturated fats Vs oils
1. Monounsaturated fats= Sunflower, corn, soybean, and flaxseed oils
2. Polyunsaturated fats are found in high concentrations in = Olive, peanut, and canola oils

A) 1 only B) 2 only C) Both 1 & 2 D) none of these

82. Atomic-force microscopy is a scanning probe microscopy (SPM) demonstrated ideal resolution. The resolution of AFM is Order of ---- times better than optical microscopy.
A) 107 B) 106 C) 104 D) 103

83. A quiz consists of 9 True/False questions. Assume that the questions are independent. In addition, assume that (T) and (F) are equally likely outcomes when guessing on any one of the questions. What is the probability of guessing on each of the 9 quiz questions and getting more than one of the True/False questions wrong? (Round to 3 decimal places).

A) 0.998 B) 0.018 C) 0.020 D) 0.980

84. What are scaffolding proteins?
A) Multiple proteins that can reach into the nucleus of a cell to carry transcription
B) Large relay proteins to which other relay proteins are attached and interact and/or bind with multiple members of a signalling pathway, facilitates signal transduction efficiency
C) Orient receptors and their ligands in appropriate directions to facilitate their complexing
D) Microtubular protein arrays that allow lipid-soluble hormones to get from the cell membrane to the nucleus

85. Identify the scientific name of whisk fern.
A) Psilotum B) Botrypus C) Dryopteris D) Marattia

86. Observe the features of Gymnosperms and select the correct ones.

1. Gymnosperms diversified in the late Paleozoic, after suffering widespread extinctions at the close of the Permian, gymnosperms re-radiated in the Triassic and dominated the global floras until the mid-Cretaceous, after which they were progressively supplanted by angiosperms.

2. Gymnosperm pollination is invariably anemophilous (primary); only recently evolved genera as Ephedra and Welwitschia are pollinated by insects

3. Coulter and Chamerlain (1917) divided the gymnosperms directly into eight orders viz. Pteridospermophytals, Cycadofilicals, Bennettitales, Cycadales, Cordaitales, Ginkoalea, Coniferales and Gnetales

4. Gymnosperm archegonia have a short or long neck made up of 2, 4, and 8 cells, in Cycas, Taxus and Biota respectively. This develops into megaspore mother cell which further undergoes free nuclear divisions, followed by cell wall formation and become a cellular structure

A) 1, 3 & 4 only B) 2, 3 & 4 only C) 1, 2 & 3 only D) 1, 2 & 4 only

87. Cell to cell communication is significant in organism's development. The cell potentiality to respond to a specific inductive signal is known as:

A) Juxtracrine signaling B) Regional specificity of induction
C) Competence D) Instructive interaction

88. Which of the following is **not** a typical incident connected with cell signaling?

A) G-proteins activation by exchanging GTP for GDP
B) Synthesis of the secondary messengers cAMP and IP3
C) Induction of protein kinases & discharge of calcium ions from cell membranes
D) Stimulation of apoptosis

89. Invented a new plant species about which you know only two features

1. it is small sized species (<10 cm)
2. short lived species (<20 days).

Which of the strategies given below is seems to be true connected with this species?

A). Early breeding and only once in life and produces large number of small sized progenies
B) Late breeding and only once in life and produces large number of small sized progenies
C) Early breeding and only once in life and produces small number of large sized progenies
D) Early breeding and more than once in life and produces large number of small sized progenies

90. Select the correct statement connected with types of signaling:
A) Autocrine signals bind to receptors and induce nearby cells
B) Signaling by cell contact similar to paracrine signaling but there is a special structure known as the synapse between the cell originating and the cell receiving the signal. Synaptic signaling only occurs between cells with the synapse.
C) Paracrine signals bind to receptors on cells that secrete them
D) Exocrine signaling occurs when cells secrete signaling molecules into the blood

91. Apoptosis occurs on a cell-by-cell basis. Which among the following statement is/are correct with regulation of apoptosis?
1. Caspase proteolytic enzymes, contributes to both regulation by the BCL-2 family and execution of apoptosis after the death decision is confirmed
2. Bax and Bak protein family, which provides the framework for controlling apoptosis, takes its name from a type of cancer called B-cell lymphoma

A) 1only B) 2 only C) Both 1 & 2 D) Neither 1 nor 2

92. Major control switches for the cell cycle, causing the cell to move from G1 to S or G2 to M
A) cyclin dependent kinase B) p53 protein
C) p27 protein D) All the above

93. Which among the following disorders/diseases are resulted in human beings due to meiotic abnormalities?
A) Down Syndrome - trisomy of chromosome 21.
B) Patau Syndrome - trisomy of chromosome 13.
C) Edward Syndrome - trisomy of chromosome 18.
D) All the above

94. Choose the correct combinations of statement/s connected with biosynthesis of jasmonic acid in plants given below.
1. 12-oxo-phytodicnoic acid get reduced and then converted to jasmonic acid via β-oxidation.
2. Action of lipoxygenase, allene oxide synthase and allene oxide cyclase takes place in peroxisome.
3. Action of allene oxide synthase and allene oxide cyclase takes place in chloroplast.
4. Final production of jasmonic acid takes place in chloroplast.
Which one of the following combination of above statements is correct?

A) 2, 3 & 4 only B) 1, 2 & 4 only C) 1, 2 & 3 only D) 1, 2, 3 & 4

95. Wild cats of the Western Ghats follow Hardy-Weinberg population principles in determining skin color. The dominant phenotype is represented by a black skin, while the recessive phenotype is represented by a grey skin colour. If half of the population carries the recessive allele, what percentage of the wild cats have black skin colour? (Assume complete dominance)

A) 25% B) 50% C) 75% D) 90%

96. Choose the correct statement from the following:
A) The conductance of biological membranes is high, the reason is that there are all kinds of ion channels and other pores penetrating the membrane and allowing additional currents to flow. It is these currents that make cells behave in complex and interesting way
B) The oxidative stress caused by Alzheimer's disease in the brain results in phospholipid alterations
C) Cell membrane associated diseases are Alzheimer's, Hyaline Membrane Disease and Cystic fibrosis
D) All the above

97. Two white flowered plants are crossed. White flowers arise due to recessive mutation. All the resulted F1 progenies have red flowers. Subsequently, the F1plants are selfed, both red and white flowered progeny are observed. What will be the ratio of red and white-flowered plants occur?

A) 3:1 B) 15:1 C) 9:7 D) 1:1

98. Which among the following is/are examples for economically important lichens?
1. Cetraria islandica 2. Lecanora esculenta 3. Evernia prunastri

A) 1 & 2 only B) 2 & 3 only C) 1 & 3 only D) All of these

99. The mushroom known as Honey mushroom which are black and resemble shoestrings are intricately constructed is:
A) *Armillaria mellea* B) *Claviceps purpurea*
C) *Wolfiporia extensa* D) *Fomitiporia ellipsoidea*

100. Choose the statements connected with Zygomycetes:
1. All are saprophytic fungi, mycelium which is well developed, profusely branched and coenocytic.
2. No motile sexual or asexual cells.
3. Asexual reproduction by sporangiospores, aplanospores or by conidia.
4. Sexual reproduction by conjugation of gametangia resulting in the formation of zygospore.

A) 2, 3 & 4 only B) 1, 2 & 3 only
C) 2 & 3 only D) All the above

101. Identify the algae displays Diplobiontic life cycle i.e., one gametophytic and two sporophytic phases (long duration) indicate its triphasic nature:
A) Polysiphonia B) Batrachospermum
C) Nemalion D) Cutlaria

102. Agar is used in instant pie fillings, canned meats or fish, and bakery icings and for clarifying beer and wine and is extracted from the species of red algae such as:
A) Gelidium B) Gracilaria
C) Pterocladia D) All the above

103. Identify the following algae to their respective algal groups:
1. Halimeda 2. Codium 3. Botryococcus

A) 1-Brown algae, 2- Green algae, 3- red algae
B) 1 & 2 -Green algae, 3- Diatoms
C) 1-Brown algae 2- Green algae 3- Diatoms
D) 1, 2 & 3 Green algae

104. In connection with the ultrastructure of the flagellum the innermost rings located on the plasma membrane, comprise the motor apparatus such as:
A) M and S rings B) P and L rings
C) S and P rings D) S and L rings

105. What is the function of Omp A protein of the outer membrane components of bacteria?
A) Anchors the outer membrane to peptidoglycan (murein) sheet
B) Proteins that form pores or channels through outer membrane for passage of hydrophilic molecules
C) Provides receptor for some viruses and bacteriocins; stabilizes mating cells during conjugation
D) Stabilizes LPS and is essential for its permeability characteristics

106. Kuru disease was confined to natives of Papua New Guinea's Eastern Highlands and was transmitted to chimpanzees. The disease was caused by:
A) Priones B) Calicivirus C) Viroids D) Virusoids

107. Diatomite is relatively inert and has a high absorptive capacity, large surface area, and low bulk density. It consists approximately of ------ silica, and the remainder consists of aluminum and iron oxides.

A) 90 % B) 50 % C) 60 % D) 80 %

108. Which among the following is/are examples for opportunistic fungi?
A) Aspergillus sp. B) Candida albicans
C) Cryptococcus neoformans D) All the above

109. Identify the correct Pteridophyta division using the features given below:
The stem in majority forms is long, articulated and ribbed with solid protostele or medullated protostele, most of the members are homosporous but some fossil forms are heterosporous. The sporangia are borne on sporangiophores.

A) Filicophyta B) Psilophyta C) Sphenophyta D) Lycophyta

110. The phenomenon of linkage was first reported by Bateson and Punnet in 1906 and was first observed in:
A) Pisum sativum B) Lathyrus odoratus
C) Datura stramonium D) Mirabilus jalapa

111. Which of the following populations could meet the criteria required for Hardy-Weinberg equilibrium?

A) A group of about 40 crows displays random mating and does not migrate to areas with other crow populations

B) A population of over 50,000 rabbits routinely travels from the southern region of India to a more central region to deal with seasonal food supply fluctuations

C) A population of about 100,000 tiger mates randomly and stays in the same area. Their mutation rate is negligible and their environment contains no factors that select for specific traits

D) Finches randomly mate on a small island in the Lakshadweep. These birds eat hard-shelled seeds, so finches with short, strong beaks experience directional selection

112. Match List I with List II

List I	List II
a. DNA pol I	1. Main enzyme that add nucleotides in the 5′ -3′ direction
b. DNA pol II I	2. Removes RNA primer and replaces it with newly synthesized DNA
c. Single-Strand Binding proteins (SSB)	3. Synthesizes RNA primers needed to start replication
d. Primase	4. Binds to single-stranded DNA to prevent DNA from rewinding back

A) a-1, b-2, c-3, d-4 B) a-2, b-1, c-4, d-3

C) a-1, b-2, c-4, d-3 D) a-2, b-1, c-3, d-4

113. Division Mastigomycota possesses 2 sub divisions. In which Haplomastigomycotina includes 3 classes. Identify the correctly match class/es with their characteristic features

1. Chytridiomycetes– Fungi producing zoospores with a single whiplash flagellum inserted at the posterior end.
2. Hyphochytridiomycetes- - Parasitic fungi Motile cells with a single tinsel flagellum at the anterior end.
3. Plasmodiophoromycetes producing biflagellate whiplash type inserted at the anterior end.

A) 2 only B) 2 & 3 only C) 1 & 3 only D) 1 only

114. Identify the bryophytes possess gemmae:

A) Marchantia & Lunularia B) Riccardia & Lophozia

C) Orthotrichum & Blasia D) All the above

115. Identify the correctly matched pair/pairs:

1. Indusiate – Marsilea
2. Non-Indusiate – Gleichenia
3. Pseudo indusiate – Adiantum

A) 1 only B) 1 & 2 only C) 1 & 3 only D) 1, 2 & 3

116. Observe & identify the correctly matched species and its soral arrangement:
A) A linear arrangement of sporangia along veins, avoiding the leaf area between the veins-Pteris
B) A line of sporangia along the leaf edge, protected usually by a rolled-over and modified laminar margin- Pityrogramma
C) An arrangement of large sori that usually expand over the entire undersurface of the blade or pinna - Polypodium
D) A linear or oblong sorus along a vein covered from one side by a narrow indusium- Asplenium

117. The male gametophyte development appears to be quite uniform within coniferales. Identify the correct statement connected with male gametophytes among coniferales.

A) In Pinaceae, two senescent primary prothallial cells are produced from the embryonal cell of the microspore. This embryonal cell functions as an antheridial initial and results in the formation of a peripheral tube cell and a generative cell. A periclinal division in the generative cell gives rise to an outer spermatogenous cell and an inner sterile cell.
B) In Taxaceae, Taxodiaceae, Cupressaceae and Cephalotaxaceae there is one prothallial cell, and the function of the antheridial initial is performed directly by the embryonal cell.
C) In Araucariaceae and Podocarpaceae, the prothallial cells show secondary proliferation. In Araucariaceae and Podocarpaceae the generative cell divides penclinally and not anticlinally.
D) All statements are correct

118. Identify the earth tongue fungi have club-shaped fruiting bodies and produce ascospores in sacs:
A) Crucibulum vulgare B) Tremella mesenterica
C) Ophiostoma ulmi D) Geoglossum fallax

119. There are phycobionts in the lichen associations contain species of:
1.Trebouxia 2. Calothrix 3. Gloeocapsa 4. Nostoc.

A) 1, 2 & 4 only B) 2, 3 & 4 only
C) 1, 3 & 4 only D) All the above

120. Choose the correct statement in connection with amplified-fragment length polymorphism (AFLP)?
A) PCR using a combination of random and gene-specific primers
B) PCR amplification followed by digestion with restriction enzymes
C) Digestion of DNA with restriction enzymes followed by one PCR step
D) Digestion of DNA with restriction enzymes followed by two PCR steps